

CLAIMS

What is claimed is:

1. A computer processor capable to execute a computer instruction which locks and then unlocks a computer resource, the computer processor being operable to lock the resource in the course of execution of the instruction before the processor has determined whether the instruction is to be executed to completion or canceled, the processor unlocking the resource by the time the instruction processing by the processor is terminated, the unlocking being performed whether or not the instruction is canceled.

2. The computer processor of Claim 1 wherein the instruction execution is pipelined, and the instruction is canceled if a trap condition occurs after the processor started processing the instruction.

3. The computer processor of Claim 1 wherein:
executing the instruction comprises reading a memory location and conditionally or unconditionally writing a memory location; and
the resource comprises the memory location to be written.

4. The computer processor of Claim 3 further comprising a cache, wherein the memory location to be written is a memory location in said cache.

A/

5. The computer processor of Claim 3 wherein the circuitry is operable to perform the reading before the processor has determined whether the instruction is to be canceled.

5

6. The processor of Claim 1 in combination with another processor having access to the same resource.

7. The processor of Claim 1 wherein instruction
10 execution is pipelined, and
if the processor determines before a pipeline stage of stages in which the unlocking is performed that the instruction is to be canceled, the instruction proceeds through all the pipeline stages at least up
15 to, and including, the stage or stages in which the resource is unlocked.

8. The processor of Claim 1 wherein:

each instruction is executed in a plurality
20 of pipeline stages, wherein the pipeline for each instruction includes a stage ST1 in which a signal is generated by the processor to indicate whether the instruction is to be canceled due to a trap;
and

25 when executing the instruction which locks and then unlocks the computer resource, the processor is operable to lock the computer resource before the stage ST1.

A2
9. The processor of Claim 8 wherein for at least
some instructions including the instruction that locks
and then locks the computer resource, the stage ST1 is
followed by a stage ST2 in which at least one
5 instruction result is written to an architecture
storage location; and

when the processor executes the instruction that
locks and then unlocks the computer resource, and the
instruction is to be canceled, the stage ST2 is
10 executed for the instruction to unlock the resource but
writing to the architecture storage location is
suppressed.

094742-032301
10. A computer processor comprising an interface
15 to a cache, the interface comprising:
address and data terminals; and

one or more control terminals to lock and unlock at
least a portion of the cache, the one or more control
terminals being operable to indicate that the cache is
20 not to store data but to perform an unlock operation.

11. The processor of Claim 10 in combination with
said cache, the cache being connected to the address
and data terminals and to the one or more control
25 terminals.

12. The combination of Claim 11 further
comprising a second processor having data and address
terminals and one or more control terminals, wherein

said terminals of the second processor are connected to the cache.

13. The combination of Claim 12 further
5 comprising a memory and a circuit for caching data from the memory in the cache.

14. A method for executing a computer instruction
by a computer processor, wherein the instruction locks
10 and then unlocks a computer resource, the method comprising:

locking the resource before the processor has
determined whether the instruction is to be executed to
completion or canceled; and then

15 unlocking the resource by the time the instruction
processing by the processor is terminated, wherein the
unlocking is performed whether or not the instruction
is canceled.

20 15. The method of Claim 14 wherein the unlocking
is performed after the processor has determined whether
the instruction is to be canceled.

Sub A3 }
25 16. The method of Claim 14 wherein the
instruction execution is pipelined, and the instruction
is canceled if a trap condition occurs after the
instructions processing by the processor has begun.

17. The method of Claim 14 wherein the
30 instruction is an atomic instruction which comprises

reading a memory location and conditionally or
unconditionally writing a memory location; and
the resource comprises the memory location to be
written.

5

18. The method of Claim 17 wherein the memory
location to be written is a cache memory location.

19. The method of Claim 17 wherein the reading
10 operation is performed before the processor has
determined whether the instruction is to be canceled.

Add A4

Add B2

0391142 032301